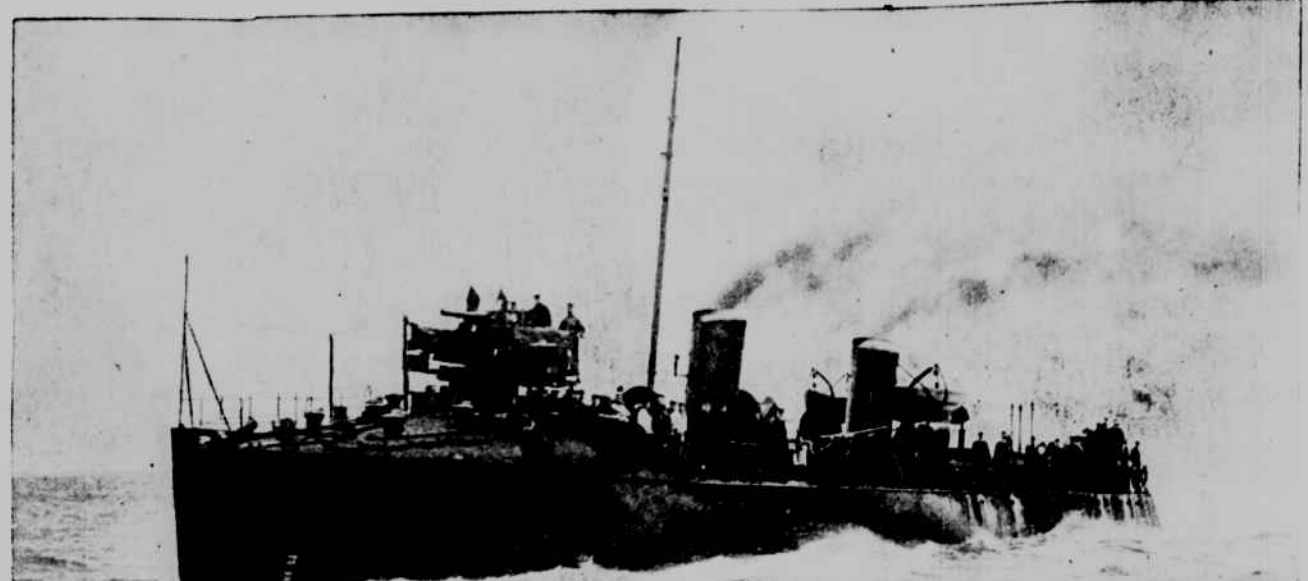


TYPE OF TORPEDO-BOAT DESTROYER WHICH THE GOVERNMENT RECENTLY SOUGHT TO PURCHASE.

WARFARE WITH TORPEDOES.

HOW THEY ARE MADE AND USED AT THE PRESENT DAY.

MINES, ANCHORED TORPEDOES AND WHITEHEADS —TYPES OF TORPEDO-BOATS.

The idea of blowing up a warship by means of a big charge of powder, placed against her sides or under her bottom, dates from the Revolutionary War. Captain David Bushnell, of Peekskill, N. Y., tried to destroy Lord Howe's flagship, the Eagle, in New-York Bay in this manner. He also released floating kegs of powder, on the Delaware River, with a similar object in view. This first undertaking involved the use of a submarine boat. Another American, Robert Fulton, devised a plan for destroying naval vessels for France; and, for exhibition purposes, he sank a launch in the harbor of Brest, in 1801. He, too, used a submarine boat.

Besides placing the explosive charge with such assistance, or letting it drift with a river or tidal current, Fulton proposed to have a torpedo anchored in a harbor or channel, making it buoyant enough so that it would try to float, but tying it below the surface of the water. A fourth plan which he matured was to suspend the torpedo on the end of a long boom, or pole, projecting from a small vessel, and to fire it by running the torpedo against the enemy's ship.

Of these various schemes the anchoring of a buoyant receptacle in a harbor has been the greatest favorite in actual warfare during the present century. At first, such a torpedo was made to explode when any heavy object came against it. Later, the fuse was so altered that two things were necessary to ignite it—actual contact with a ship, and a current of electricity supplied through insulated wires running to a convenient station on shore. Sometimes such torpedoes were arranged to be exploded only by electricity.

"Mines" differ from anchored torpedoes but little. They lie on the bottom of a harbor or river, and are weighted so as to stay there. Originally they contained gunpowder of the old-fashioned sort. Nowadays, like anchored torpedoes, they are filled with dynamite or gun-cotton, which has a higher explosive power. The exact position of each mine or torpedo in a harbor is carefully charted, and some official knows exactly where it is situated, although the information is kept from the public. Dozens, scores of them, have been placed in each of our chief Atlantic harbors.

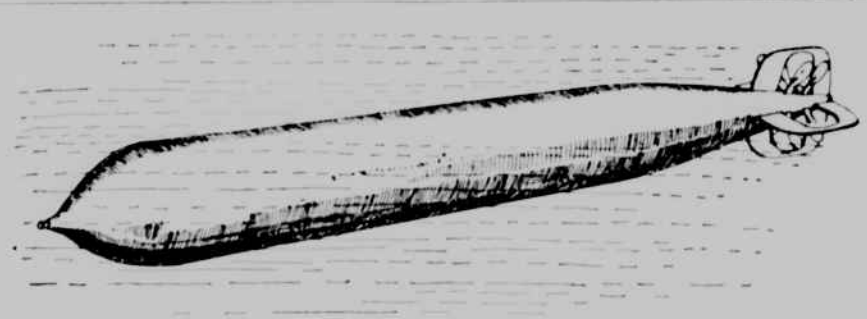
Within the last few years two other types of torpedo, very much alike, have come into fashion. They are intended to navigate the waters of a bay, river or the open sea several feet below the surface. What is called the controllable torpedo is connected by some insulated wires, bound together in a light cable, with a land station, from which, by electricity, its movements can be directed. The "fish" or "automobile" torpedo has no such connection with the shore (or any other launching station), and swims freely when once released.

The controllable torpedo is a hollow steel shell, shaped like a gigantic cigar. In one of its forward compartments it carries a big charge of gun-cotton or dynamite (from 200 to 300 pounds) and a firing mechanism which, after its trigger has been set, will go off the instant the nose of the torpedo hits any solid object, such as a ship. At the rear end there is a small screw propeller and various rudders. Inside there is a tank in which is coiled up the electric cable. The latter is about a mile long, and is paid out automatically as the torpedo travels through the water.

One variety of the controllable torpedo invented by Edison had upright rods erected near each end, by means of which a long horizontal wooden float was fixed parallel with and six feet above the torpedo. Thus the depth to which the latter was submerged was easily regulated. Knobs, on still more slender rods, protruded from the water and served as a guide to the operator. The rudder that turns this fearful missile toward the right or the left is moved by electricity from shore; but sometimes an extra rudder is provided, tending to throw the head of the projectile upward or downward. This is automatically controlled by a pendulum and other apparatus in the torpedo itself, which corrects any tendency to travel either above or below the proper level. The power to run the electric motor which drives the screw is sometimes afforded by a storage battery borne inside the torpedo, and sometimes from a dynamo on shore. In the latter case a connection is had by one of the wires of the cable.

Controllable torpedoes have been designed which were from 20 to 40 feet long, 18 to 24 inches in diameter at the middle, and weighing from 2,000 to 7,300 pounds. Very few of this style of torpedo, though, have ever come into actual use.

The fish torpedo is rarely more than 12 feet long; its diameter seldom exceeds 18 inches, and it weighs from 500 to 1,000 pounds. One of the best-known varieties of this type, designed by Robert Whitehead and first publicly tested in 1864, contains a tank of compressed air and a little engine that is driven thereby. Another, invented by Rear-Admiral Howells, of the United States Navy, in 1871, is provided (inside) with a very heavy flywheel, the axle of which projects through the shell. Just before the torpedo is launched power is applied from the outside in such a manner as to set the flywheel spinning at a tremendous velocity. By means of gearing motion is imparted to the propeller shaft of the torpedo. Both the Whitehead and the Howells torpedoes have enough power to travel a mile or so, and the first part of the trip is made at the rate of from 25 to 35 miles an hour. They have automatic rudders, which keep them submerged to the prescribed depth and keep them straight on their course when they have been once launched.



GENERAL VIEW OF WHITEHEAD TORPEDO.

The original theory of torpedo warfare was that it was to be conducted for purposes of defence, and was to be directed against invaders' ships. For this and other reasons it was deemed wise to build boats which were quite small and adapted only to comparatively smooth water to engage in this form of attack. But in order to insure quickness of operation their models and engines were designed with a view to high speed. Few big war vessels, until five years ago, could make twenty knots an hour. But torpedo-boats are designed to travel from twenty to twenty-five. In size, at first, they were divided into three groups. A first-class torpedo-boat displaced about 75 or 100 tons a few years ago; one of the second class, 50 or 60 tons; one of the third class, from 15 to 25 tons. A third-class torpedo-boat could easily be carried on the deck of a big cruiser. It will be shown in a moment that larger ones are now constructed.

It is customary to equip a torpedo-boat with two, three or four "launching tubes" for torpedoes of the automobile type. These tubes are usually fixed in the frame of the boat, and open out directly forward or directly astern, below the water-line. Sometimes, however, they are mounted on deck. Occasionally, too, they are arranged so that they may be swung about to be aimed. Within the last few years it has been customary to supplement the armament of cruisers and battle-ships with two or three torpedo tubes. In such cases they are generally placed amidships, above the water-line, and point to one side.

An expulsion tube for torpedoes need not be as heavy as a cannon. It is thin, of even thickness, and of only the necessary length for the torpedo. This is put in at the breech. And, as the torpedo is smaller at the ends than in the middle, a light wooden framework is built around it to keep it aimed correctly. Three or four different methods of ejecting the torpedo are employed. A small charge of powder, a jet of water or a little compressed air will do the work. Powder is the favorite agent in American practice.

The torpedo-boat delivers its attack at night, and by stealth. Pains are taken to suppress all sparks from the smokestacks. No lights are shown anywhere. The little vessel is painted as near the color of the sea as possible, to avoid detection. If possible, she comes within an eighth of a mile of her enemy before launching a torpedo, and then darts away in a hurry. In anticipation of such an attempt a big war vessel at night, when at anchor, employs powerful searchlights in her lookout. Defence by means of wire netting stretched around the ship is no longer attempted. The device is not proof against torpedoes.

Latterly a new type of boat has come into existence. The "torpedo-boat destroyer," or "torpedo cruiser," or "torpedo-boat catcher" is stanch enough to cross the ocean. She has engines that give her a speed of from 30 to 35 knots, she carries powerful searchlights, and, though she may have two or three launching tubes for torpedoes also, her chief weapons are what are called rapid-fire guns, capable of throwing a perfect hail of small missiles. Such craft are designed to detect, pursue upon and sink the common torpedo-boat. Their tonnage ranges from 200 to 350 usually, and they are exceedingly agile, dangerous boats. When a fleet is at anchor the destroyers usually act as sentinels, cruising slowly about a few miles from the big ships.

The construction of forty-two destroyers of the Havock class, making 26 or 27 knots an hour, was authorized for the British Navy in 1893. And since that time forty-four more, with a minimum speed of 30 knots, have been ordered. Eight of these latter participated in the great naval review on the occasion of the Queen's Jubilee, last June. Among them were the Fame and Desperate, of which this description has been given by "Industries and Iron":

"The armament consists of one 12-pounder and five 6-pounders, as against two 12-pounders and three 6-pounders of the Daring. Each vessel is fitted with two torpedo tubes instead of three in the smaller type of boat, the bow torpedo discharge being dispensed with.

"A commander's bridge or platform is built at the forward part of the vessel, just abaft the conning tower, sufficiently large to enable the steering-wheel and navigating appliances to be fitted on it. A different form of bow has also been adopted in this type of destroyer; that is to say the stem partakes more of the shape of a cutwater above the water line, and slopes in a forward direction. The bows on each side also flare outward in order to minimize the spray and rush of water on deck when these vessels are being driven at full speed, which interfere with the efficient manipulation of the forward gun. The after portion of these vessels is also an improvement on the Daring type of destroyer.

"The machinery in each of these vessels consists of two sets of engines of the triple-expansion type, the cylinders being 20 inches, 29 inches and two 30 inches in diameter, respectively, with a stroke of 18 inches. The boilers are three in number, and are of the Thornycroft water-tube type. The two forward boilers are placed back to back and have a chimney in common, while the after boiler has one to itself. The forward chimney has naturally a larger cross-area than the other, but the chimney casings are made of the same size, so that in appearance both funnels are alike. The annular space between the after chimney and its casing is made to serve as an upcast shaft, by means of which the engine-room is ventilated. This arrangement has been found by experience to work very well in practice, a comparatively cool engine-room being thus secured—no small advantage in the confined space full of high-pressure steampipes with which these boats are crowded.

"The indicated horse-power of the Fame and Desperate is 5,400, the mean speed on the measured mile being 30.155 and 30.428 knots, respectively, while the corresponding mean speeds for three consecutive hours was 30.15 and 30.018 knots. The coal capacity of each of these vessels is eighty tons.

"The Foam is a similar boat in all respects to the above, attaining 30 knots speed on trial. She was also built and engined by Messrs. Thornycroft in 1896.

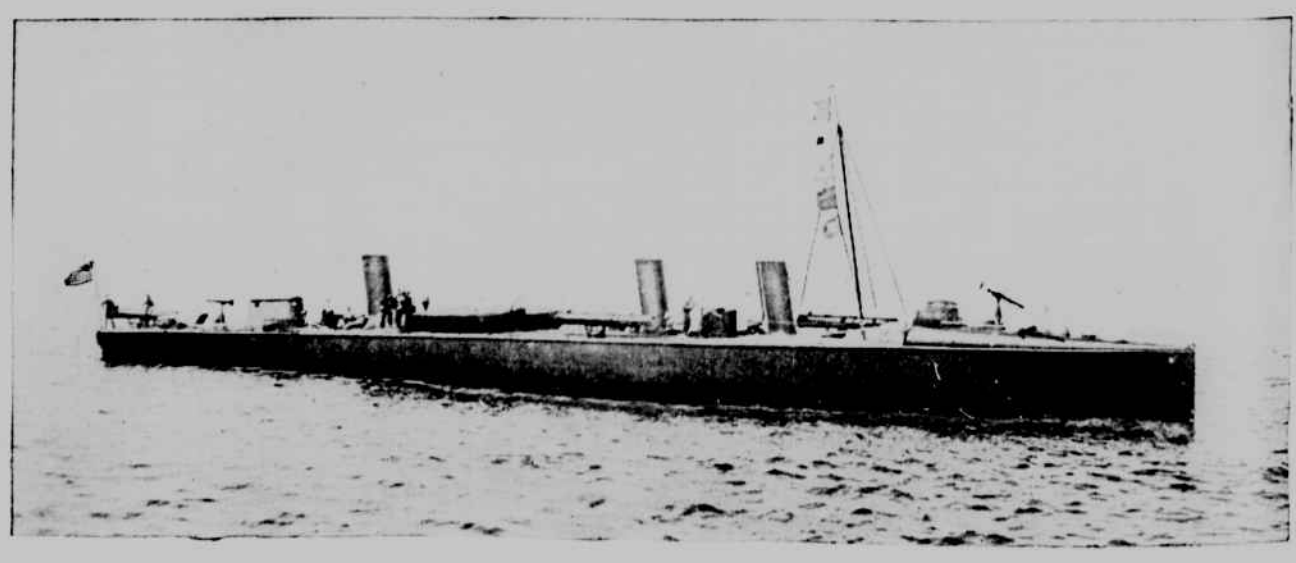
"The Sparrowhawk, Virago, Quail and Thrasher are also 30-knot destroyers, and were designed, built and engined by Messrs. Laird Brothers, Birkenhead, in 1896. The general particulars of these vessels are: Dimensions, length, 213 feet; breadth, 21 feet 6 inches; depth, 9 feet 9 inches; indicated horse-power, 6,000; speed, 30 knots; bunker capacity, 90 tons; armament, one 12-pounder quick-firing gun; five 6-pounder quick-firing guns; two 18-inch torpedo tubes; complement, 60 officers and men."

The trial boat Turbinia, built for the British Navy last year, is neither a torpedo-boat nor a destroyer, being too small and too frail for service in either capacity. She has shown, however, with her two novel features, Mr. Parsons's turbine engine and the placing of three screws on each of her three propeller-shafts, she can make 35 knots, and now the Admiralty has ordered the construction of a larger boat for purposes of warfare utilizing these new ideas.

Occasionally a fleet of torpedo-boats is attended for purposes of escort and supply by a vessel displacing 500 or 1,000 tons, and not designed for a speed of over 20 knots. These are called "torpedo gunboats" or "torpedo division-boats," the latter title signifies "a leader of a division of torpedo-boats." But while much larger than the "torpedoers" the gunboats are much slower. They usually have launching tubes, but the distinguishing feature of them is their guns and the protective service they render.

The Holland submarine boat, elsewhere described, is to be regarded as a torpedo-boat.

The use of aluminum for construction of torpedo-boats has received much attention from foreign and American naval experts. Two boats of this material are already in existence abroad, and the plates for two American boats have recently been ordered from a Pittsburg concern.



TORPEDO-BOAT FOOTE.

168 tons; 2,000 horse-power; 27 knots speed. Lieutenant William L. Rodgers commanding.